ELECTRONIC CROSSOVER

SF-700

KCL

INSTALLATION, OPERATION AND SERVICE MANUAL

Including PARTS LIST, CIRCUIT DIAGRAMS, AND MOUNTING TEMPLATE

PIONEER®

FEATURES

A PROFESSIONAL LEVEL COMPONENT

The SF-700 employs specially selected "low-noise" transistors throughout. All parts are precision-made. There is no insertion loss and entirely negligible distortion.

PRECISE CONTROL

There are 3 kinds of cutoff characteristics available to obtain ideal tone, according to your speaker systems and room acoustics. The SF-700 gives you individual output control for perfect matching or speakers and amplifier.

VERSATILITY

A three-dimensional system is possible with the SF-700. Various crossover frequencies can be selected for perfect reproduction in either a 2-channel of 3-channel system.

EASY TO USE

The panel of the SF-700 has been carefully laid out to provide easy-reading controls and simple operation.

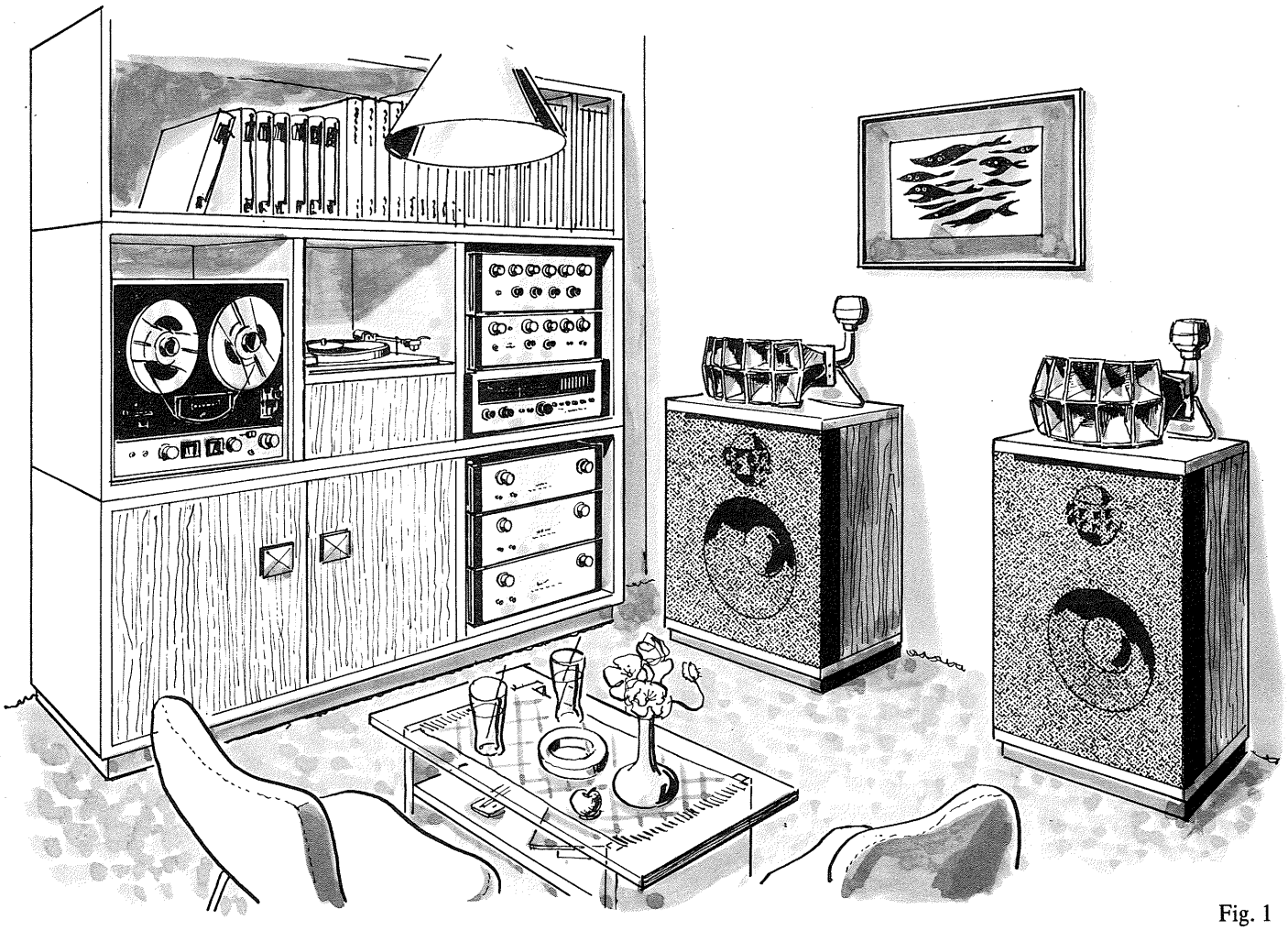


Fig. 1

STEREO SYSTEM EXAMPLES USING SF-700

1. Typical stereo systems using PIONEER UA series units.

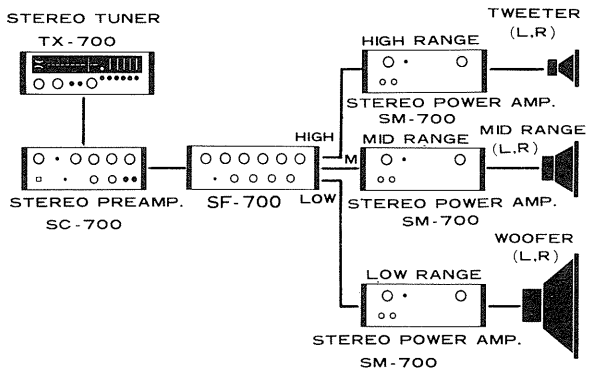


Fig. 2

2. If you have separate stereo preamplifier and stereo power amplifiers, arrange your system referring to the system configurations shown in Figs. 2 and 3 .

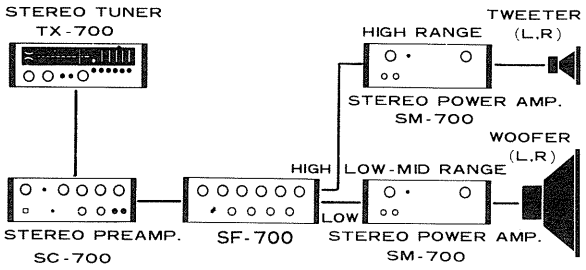


Fig. 3

3. Typical stereo system using an amplifier unit containing both a stereo preamplifier and a stereo power amplifier.
   a. The preamplifier and power amplifier sections of the unit can be used separately. In this case, a three-way stereo system may be constructed as shown at right (For a two-way system, omit the midrange channel).

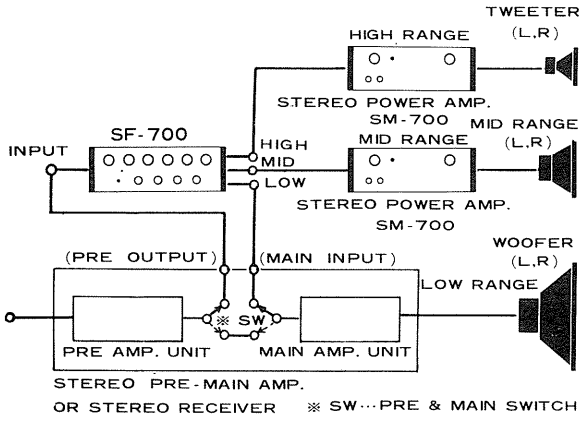


Fig. 4

b. If the preamplifier and power amplifier sections of the unit cannot be used separately, a three-way stereo system may be constructed as shown at right (For a two-way system, omit the midrange channel).

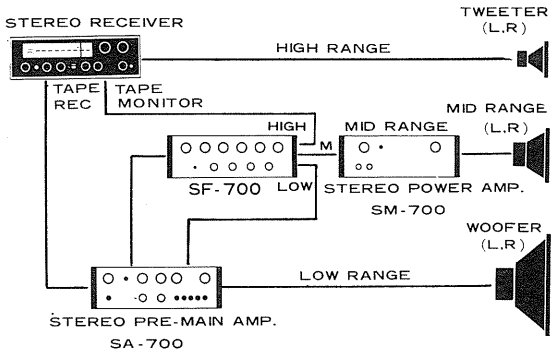


Fig. 5

4. 3-dimensional system

A 3-D stereo system can be constructed essentially in the same way as explained in 1, 2 and 3 on the previous page, except for the low-channel range connection. The low-channel output should be derived from the CENTER CHANNEL terminal of the SF-700 and connected to a monophonic power amplifier. A 3-D system does not require a stereo power amplifier for the low-channel range and, hence, requires only one woofer in the system.

One consideration in constructing a 3-D system is to set the crossover frequency between the low and the middle channel ranges to either 125 Hz or 250 Hz, because the 3-D system makes use of the non-directional characteristic of low frequencies.

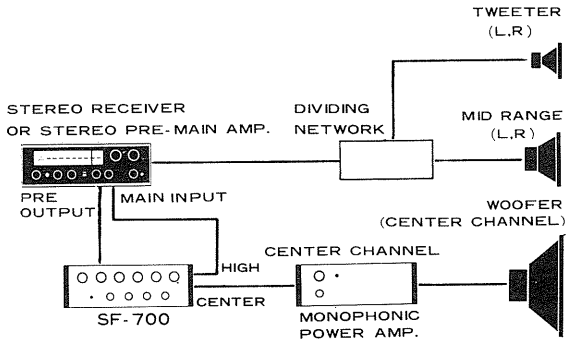


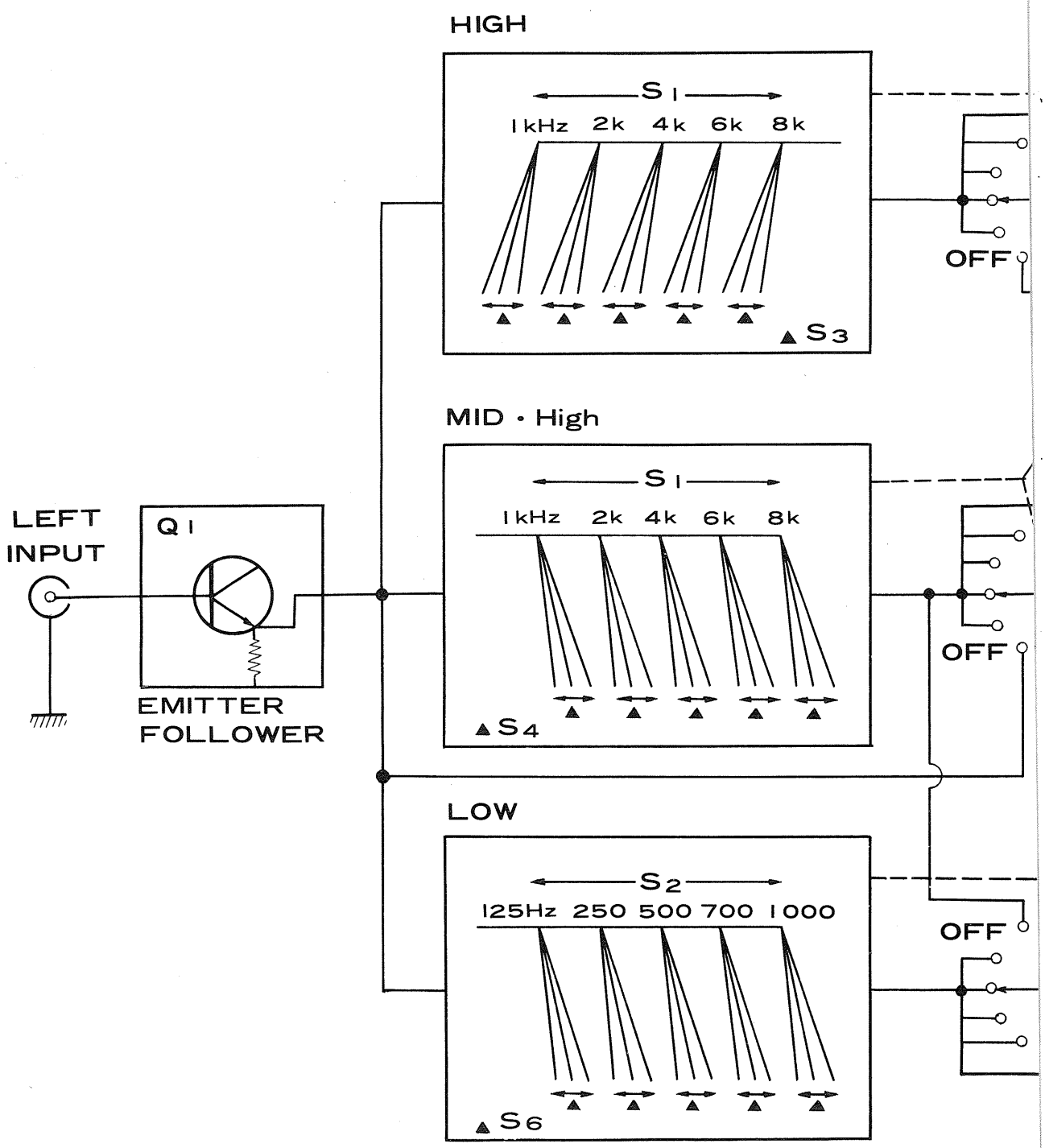
Fig. 6

MULTICHANNEL AMPLIFIER SYSTEM CONNECTIONS

PREAMPLIFIER CONNECTION

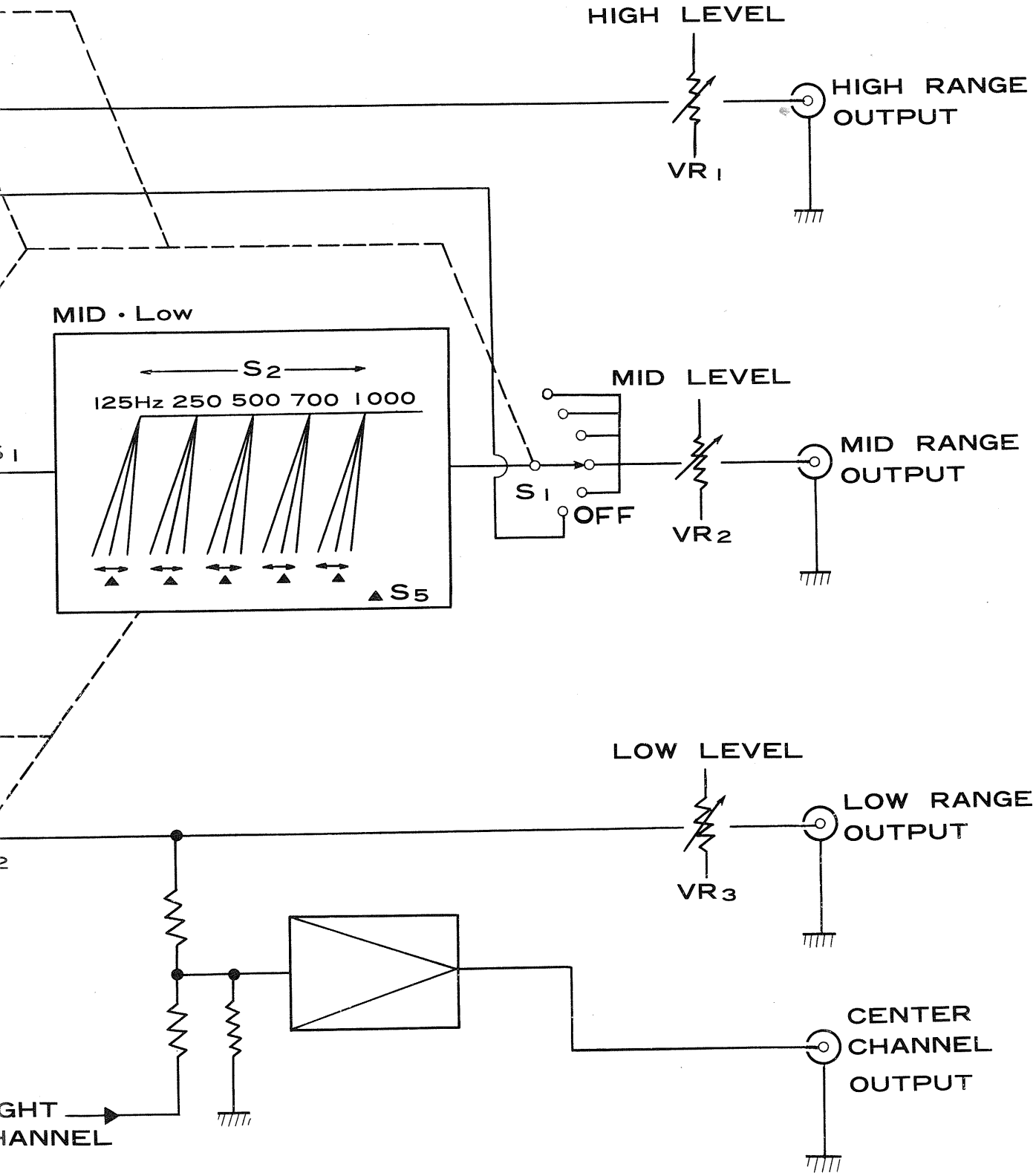
Connect the INPUT of the SF-700 to the output jack of your preamplifier. If your stereo amplifier contains both a preamplifier and power amplifiers which can be used separately, connect the INPUT of the SF-700 to the PREAMP OUTPUT of the amplifier.

Note that the INPUT jack on top is for the left-channel connection, and that the one on the bottom is for the right-channel connection. Be sure that the left and right-channel INPUT jacks of the SF-700 are properly connected to the corresponding channel output jacks of the preamplifiers.



S_1, S_2···CROSSOVER FREQUENCY SELECTORS
S_3, S_4, S_5, S_6 ····· SLOPE SELECTORS
VR_1, VR_2, VR_3 ····· LEVEL CONTROLS

FROM


HIGH LEVEL
HIGH RANGE
OUTPUT
VR 1
MID • Low
S2
125Hz 250 500 700 1000
MID LEVEL
MID RANGE
OUTPUT
S 1
OFF
VR 2
S5
LOW LEVEL
LOW RANGE
OUTPUT
VR 3
CENTER
CHANNEL
OUTPUT

ELECTORONIC CROSSOVER NETWORK

SF-700

KCL

PIONEER

SF-700

SWITCHES

S_1 CROSSOVER FREQ. SELECTOR (MID-HIGH)
1) OFF
2) 1kHz
3) 2kHz
4) 4kHz
5) 6kHz
6) 8kHz

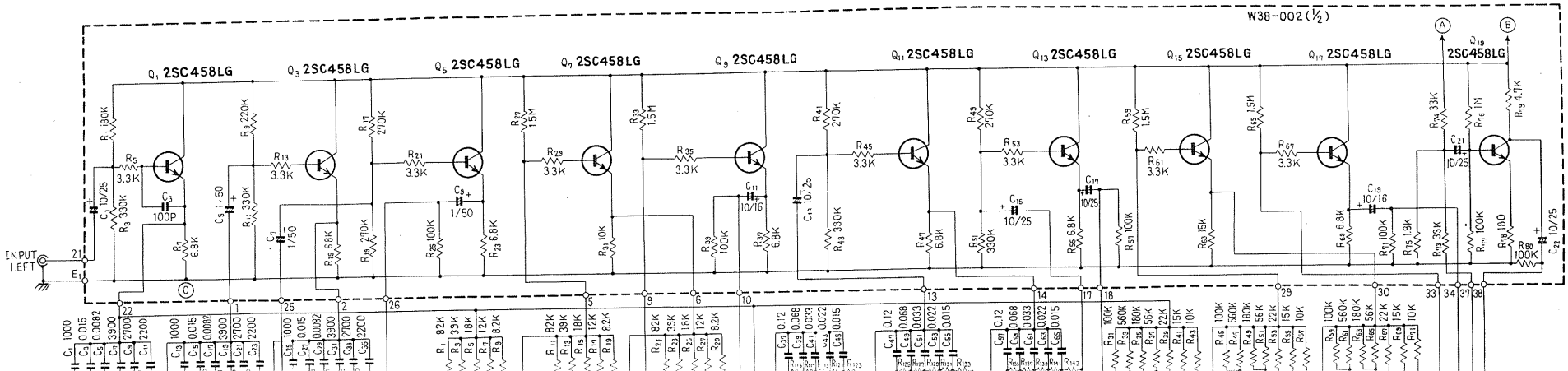
S_2 CROSSOVER FREQ. SELECTOR (LOW-MID)
1) 12.5Hz
2) 250Hz
3) 500Hz
4) 700Hz
5) 1kHz
6) OFF

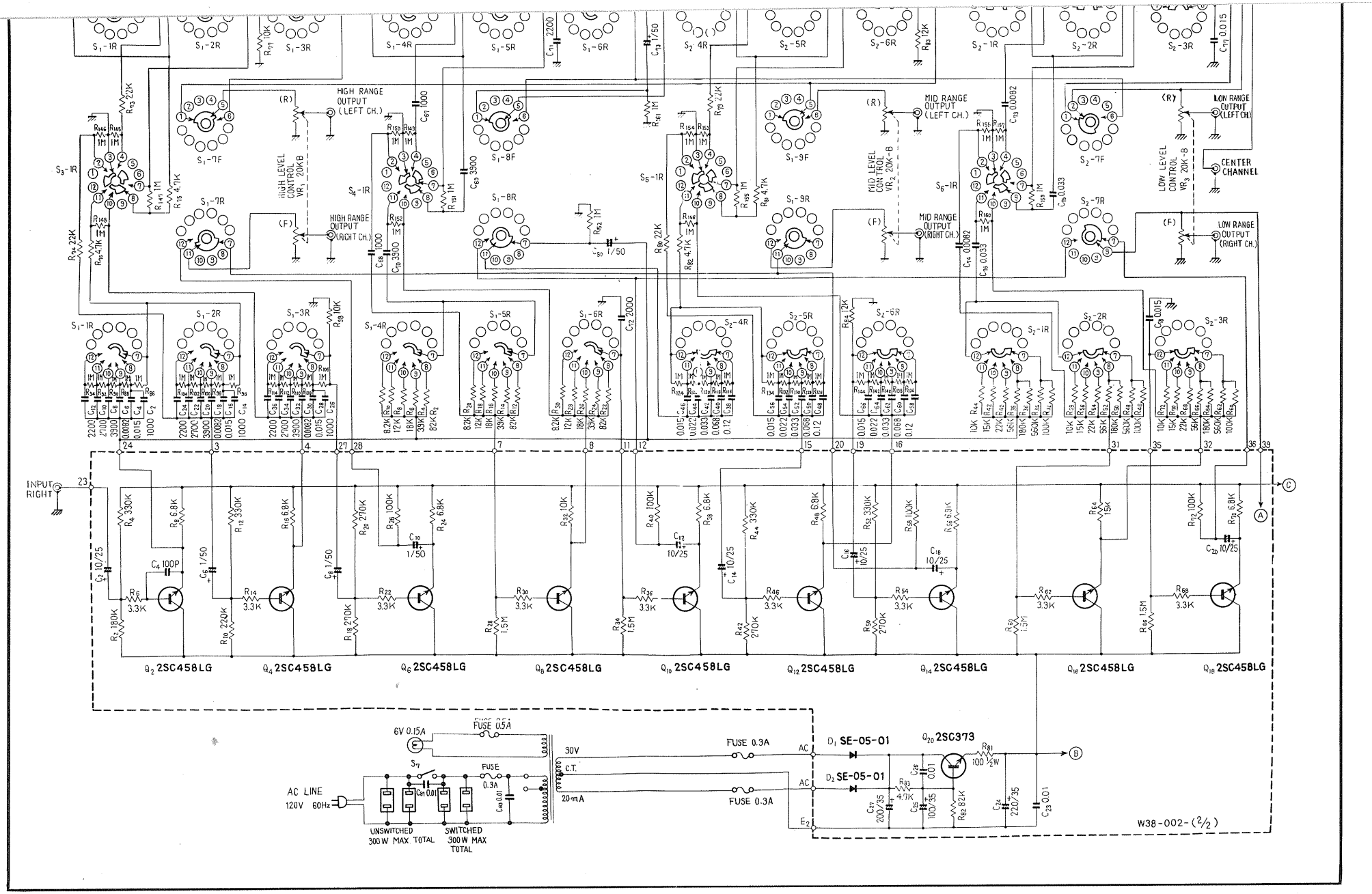
$S_3 \sim S_6$ SLOPE SELECTOR
S_3 HIGH S_4 MID-HIGH
S_5 MID-LOW S_6 LOW
1) 6dB/oct
2) 12dB/oct
3) 18dB/oct

S_7 POWER SWITCH

RESISTORS
NONMARK : OHM
K : KILOHM
M : MEGOHM

CAPACITORS
NONMARK : μF
P : pF




INPUT RIGHT
HIGH RANGE OUTPUT (LEFT CH.)
HIGH RANGE OUTPUT (RIGHT CH.)
HIGH LEVEL CONTROL VR1 20KB
MID RANGE OUTPUT (LEFT CH.)
MID RANGE OUTPUT (RIGHT CH.)
MID LEVEL CONTROL VR2 20K-B
LOW RANGE OUTPUT (LEFT CH.)
LOW RANGE OUTPUT (RIGHT CH.)
LOW LEVEL CONTROL VR3 20K-B
CENTER CHANNEL
Q2 2SC458LG
Q4 2SC458LG
Q6 2SC458LG
Q8 2SC458LG
Q10 2SC458LG
Q12 2SC458LG
Q14 2SC458LG
Q16 2SC458LG
Q18 2SC458LG
6V 0.15A
FUSE 0.5A
30V
C.T.
20-mA
FUSE 0.3A
AC LINE
120V 60Hz
UNSWITCHED 300W MAX TOTAL
SWITCHED 300W MAX TOTAL
D1 SE-05-01
D2 SE-05-01
Q20 2SC373
W38-002-(2/2)

THREE-WAY SYSTEM CONNECTION

To construct a three-way system, you must have three stereo power amplifiers, one each for the low-, middle-, and high- channel ranges, and their corresponding speakers (a woofer, a midrange and a tweeter). If you have a stereo amplifier containing both a preamplifier and power amplifiers, you need only two additional stereo power amplifiers.

1. Connect the LOW output jacks of the SF-700 to the LOW input jacks of your power amplifier. If you are planning to use the power amplifier section of your amplifier for this purpose, connect the LOW output jacks of the SF-700 to the input jacks of the power amplifier section.
2. Connect the MID output jacks of the SF-700 to the MID input jacks of the second power amplifier.
3. Connect the HIGH output jacks of the SF-700 to the HIGH input jacks of the third power amplifier.
   Note that the LOW, MID, and HIGH output jacks on the top are for the left channel connections, and those on the bottom, for the right channel connections. Be sure that the left- and right-channel output jacks of the SF-700 are properly connected to the corresponding channel input jacks of your power amplifiers.

TWO-WAY SYSTEM

To construct a two-way system, you must have two stereo power amplifiers, one each being for the low- and high- channel ranges, and their corresponding speakers. If you have a stereo amplifier containing both a preamplifier and power amplifier.

1. Connect the LOW output jacks of the SF-700 to the LOW input jacks of your power amplifier. If you are planning to use the power amplifier section of your amplifier for this purpose, connect the LOW output jacks of the SF-700 to the input jacks of the power amplifier section.
2. Connect the HIGH output jacks of the SF-700 to the HIGH input jacks of the other power amplifier.

3-DIMENSIONAL (3-D) SYSTEM

1. Connect the CENTER CHANNEL output jack of the SF-700 to the input jack of your power amplifier.
2. For a three-way 3-D system, connect the MID and HIGH output jacks of the SF-700 to the corresponding input jacks of the middle- and high-frequency channel power amplifiers in the same way as explained for the three-way system connection. For a two-way 3-D system, connect only the HIGH output jacks of the SF-700 to the input jacks of the high-frequency channel power amplifier.

CONNECTION DIAGRAM

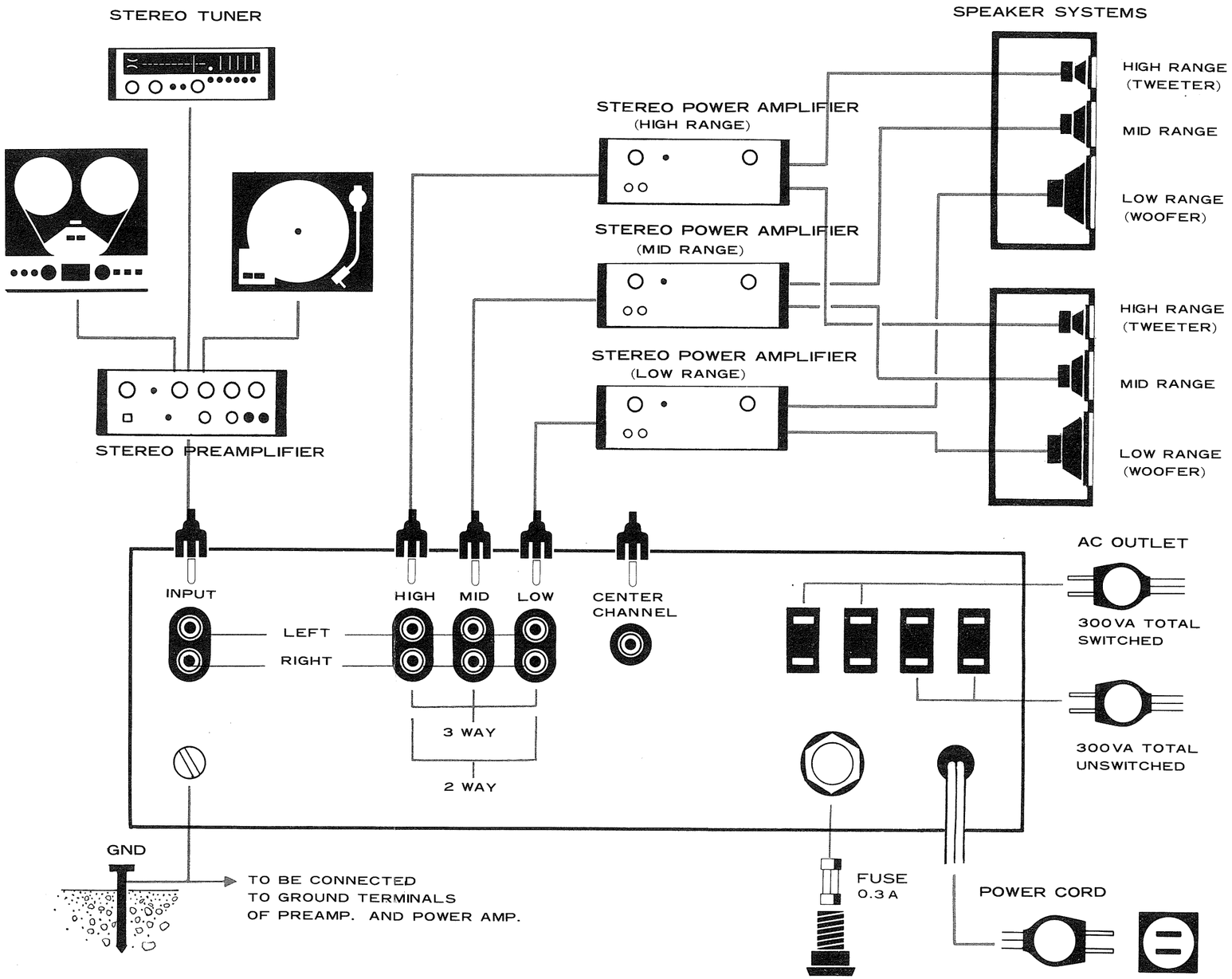


Fig. 7

SWITCHES AND CONTROLS ON FRONT PANEL

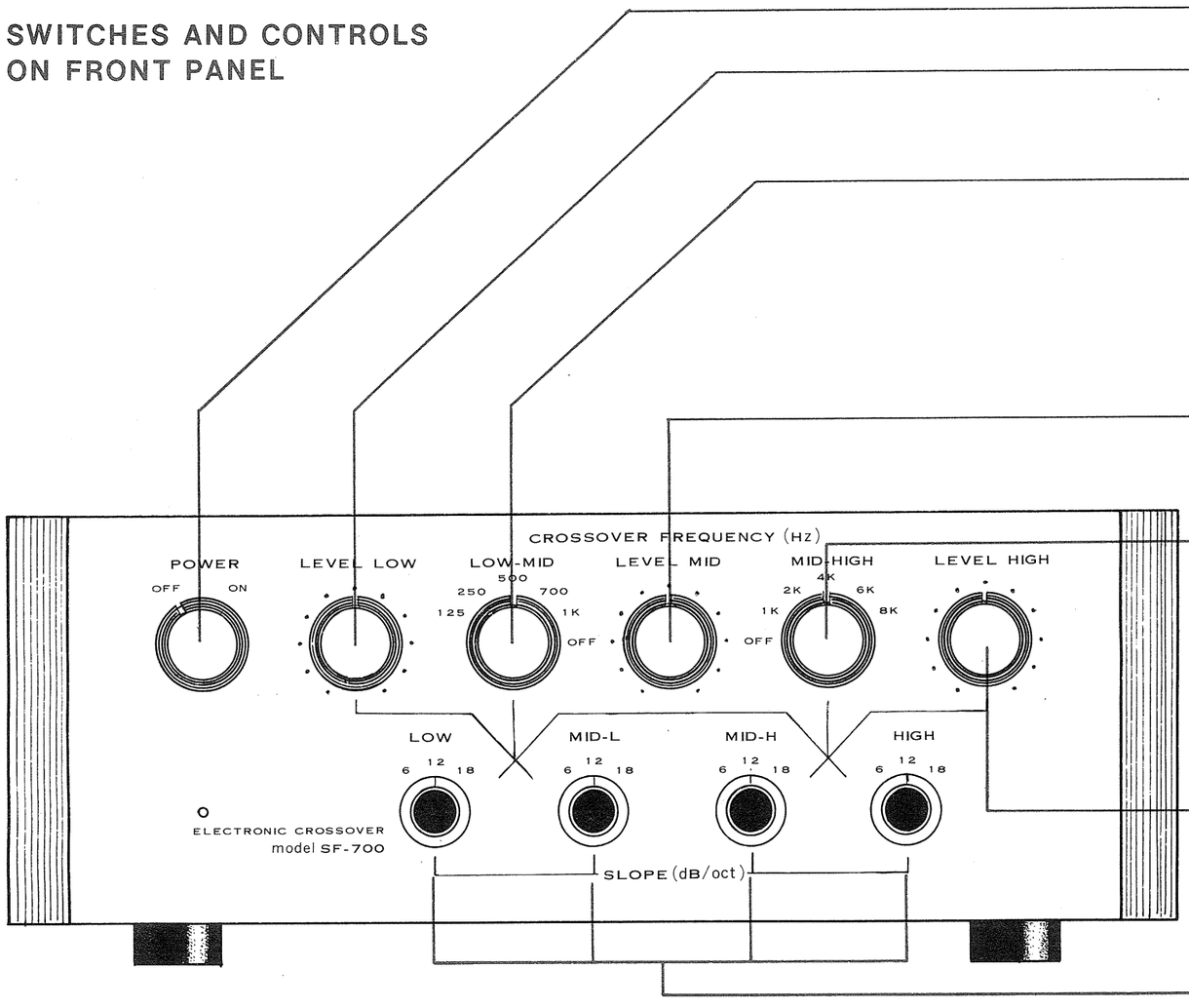


Fig. 8

POWER

Controls power to the SF-700 unit.

LEVEL LOW

Controls the low-channel output level. Turning it clockwise will increase the level, and turning it counterclockwise will decrease the level.

LOW-MID

Selects the crossover frequency between the low-channel and the middle-channel ranges. Setting this switch to OFF will defeat the function of this switch and allow the MID-HIGH switch to determine the crossover frequency between the middle-channel (including the low-channel range) and the high-channel range. With this switch set to OFF, no output is present at the MID output jacks.

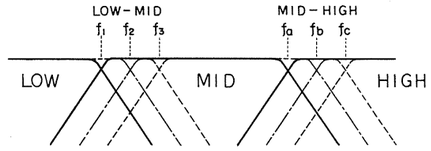


Fig. 9

LEVEL MID

Controls the middle-channel output level. The use of this switch is essentially the same as that of LEVEL LOW.

MID-HIGH

Selects the crossover frequency between the middle-channel and the high-channel ranges. Setting this switch to OFF will defeat the function of this switch and allow the LOW-MID switch to determine the crossover frequency between the low-channel range and the middle-channel range (including the high-channel range). With this switch set to OFF, no output will be present at the MID output jacks.

NOTE: If both LOW-MID and MID-HIGH are set to OFF, no output will appear at any output jack.

LEVEL HIGH

Controls the high-channel output level. The use of this switch is essentially the same as that of LEVEL LOW.

SLOPE

Selects the crossover cut-off characteristics of the SF-700 outputs. Each SLOPE switch can select either 6 dB/oct., 12 dB/oct. and 18 dB/oct. cut-off characteristics.

- **LOW**

  Selects the cut-off characteristic of the middle-channel side of the low-channel range.

- **MID. L**

  Selects the cut-off characteristic of the low-channel side of the middle-channel range.

- **MID. H**

  Selects the cut-off characteristic of the high-channel side of the middle-channel range.

- **HIGH**

  Selects the cut-off characteristic of the middle-channel side of the high-channel range.

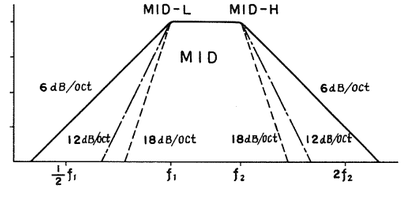


Fig. 10

MOUNTING TEMPLATE FOR MODEL SF-700

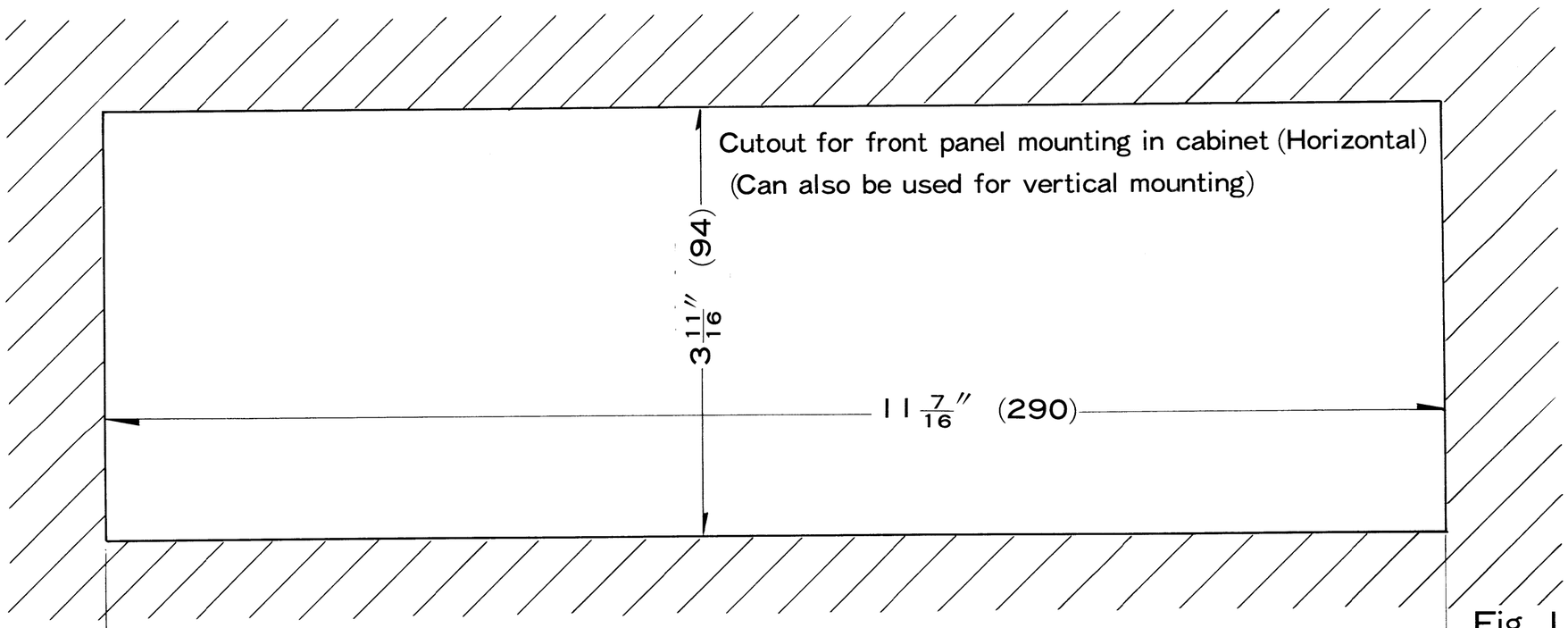


Fig. 1

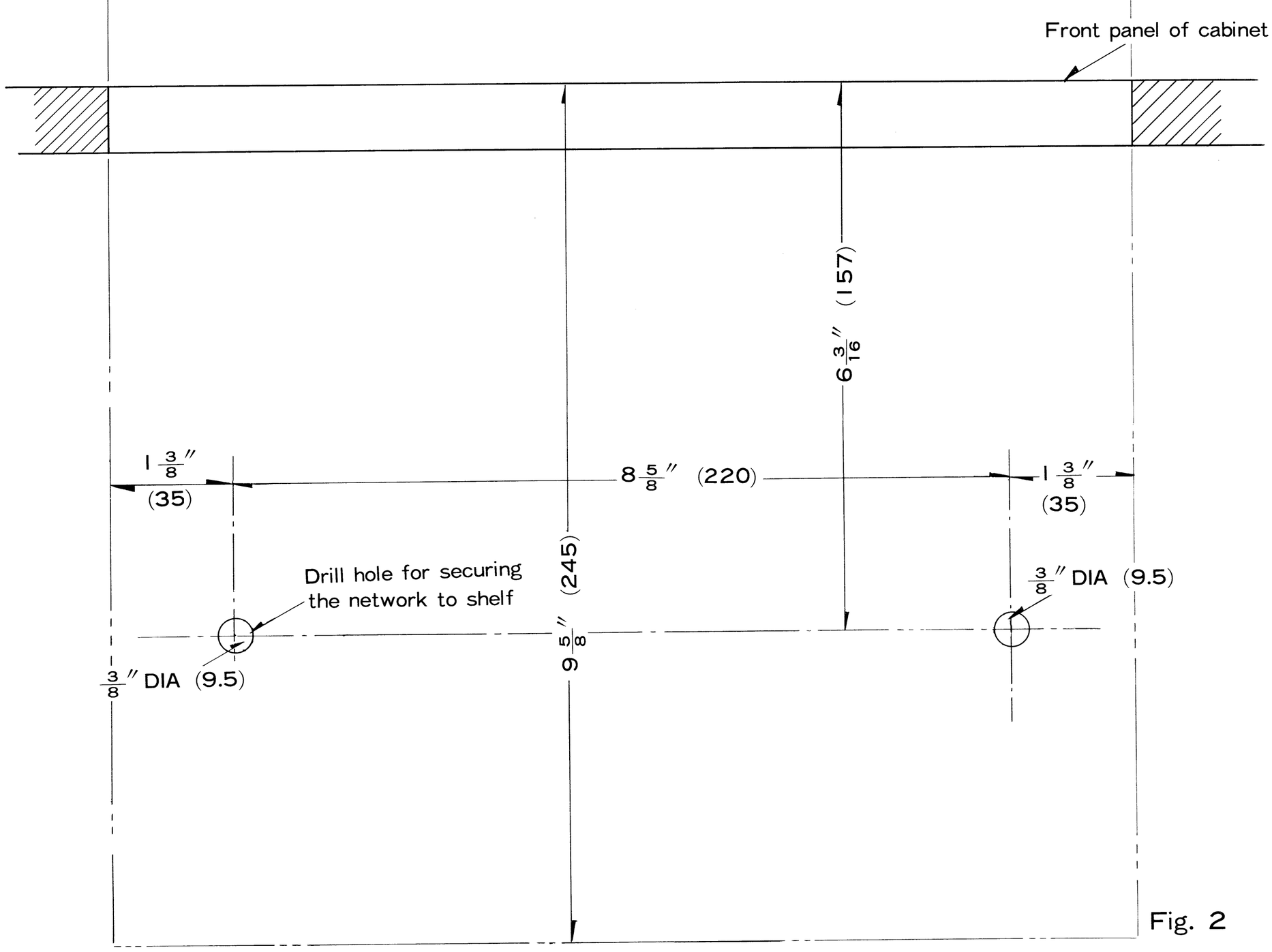


Fig. 2

UNIT : inch (mm)

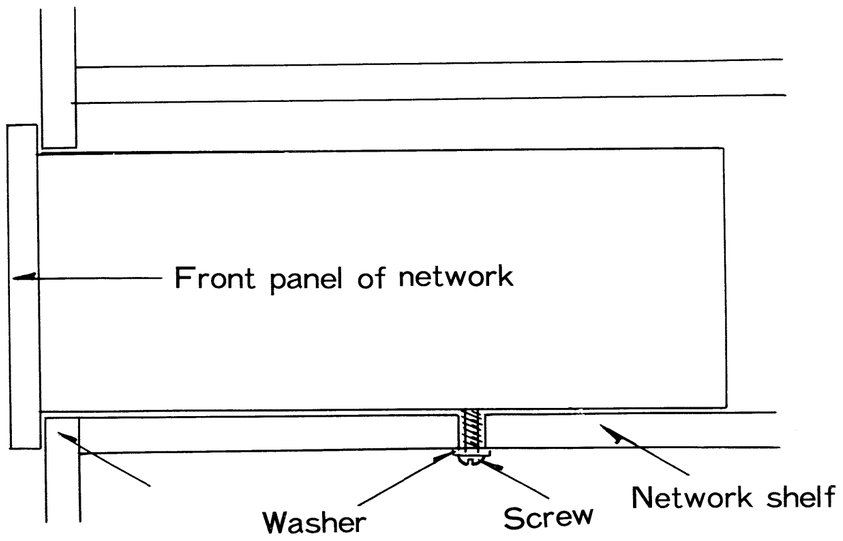


Fig.3

IMPORTANT INSTRUCTIONS

1. Follow the dimensions as shown. Measure template before using because of possibility of paper shrinkage.
2. Open the front panel of cabinet as shown in Fig.1.
   The top of the network shelf should be higher than the bottom side of the cutout. (See Ⓐ in fig.3.)
3. Prepare the network shelf as shown in Fig.2.
4. Remove the four feet on the bottom plate.
5. Secure the network in position on the network shelf with the screws and washers.

PRINTED IN JAPAN

OPERATION

- A multichannel amplifier system includes several additional controls and adjustments as compared with an ordinary stereo system. To get the best performance from your multichannel amplifier system, you must set these controls and adjustments properly. Universal procedures for adjustment of multichannel amplifier systems cannot be described, because the resulting performance varies from one system to another, depending on the quality and characteristics of the preamplifiers, power amplifiers, and speakers used, and also the room acoustics. Therefore, at the final stage of adjustment, you may have to depend on your own ears for best performance of your system.
- Before turning the SF-700 on, make sure that all connections have been properly made. It is advisable to turn off the power switches of the power amplifiers or to reduce the volumes of the power amplifiers to minimum whenever changing the switch or control settings of the SF-700.

THREE-WAY SYSTEM

1. Turn the LEVEL LOW, LEVEL MID and LEVEL HIGH controls fully counterclockwise. (This sets the output levels to minimum.)
2. Check the brochures of the speakers to be used and find the recommended crossover frequencies for them. Set the LOW-MID and MID-HIGH switches of the SF-700 to the recommended crossover frequencies.
3. Use the SLOPE switches for selecting the cut-off characteristics of the low-, middle- and high- channel ranges. The optimum cut-off characteristic for one frequency range is usually determined from the cut-off frequency of the speaker to be used (beyond which the speaker is unable to reproduce sound) and the crossover frequency of the particular frequency range. For example, if a woofer's cut-off characteristic is 2 kHz and it is used at 1 kHz crossover, optimum performance may be obtained with the LOW SLOPE switch set to a cut-off of 18 dB/octave. On the other hand, if the same woofer is used for 125 Hz or 250 Hz crossover, optimum performance may be obtained with the LOW SLOPE switch set to a cut-off of 6 dB/octave. In general, if the gap between the crossover frequency selected and the cut-off frequency of the speaker is small, 18 dB/octave is recommended as the cut-off characteristic, and if the gap between the crossover frequency selected and the cut-off frequency is large, 6 dB/octave or 12 dB/octave is recommended as the cut-off characteristic of the particular frequency range.
4. Set all volume controls of the preamplifier to the lowest levels and then turn the amplifiers on.
5. Turn the preamplifier volume controls to their midpoints, turn the level controls of the SF-700 to their midpoints, and start playing a record.

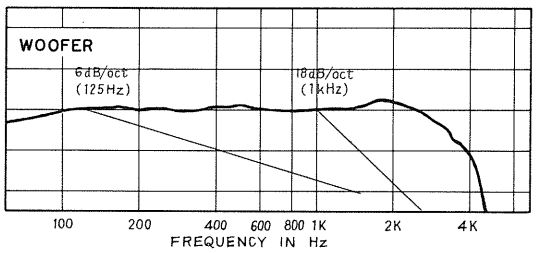


Fig. 11

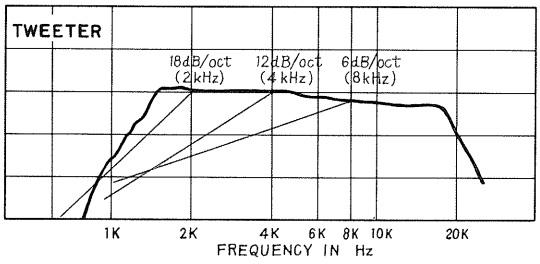


Fig. 12

6. Increase the preamplifier volumes gradually until the output reaches an optimum level.
7. Listen carefully to the music reproduced by the system and, if desired, readjust the switches and level controls of the SF-700 for optimum performance, in keeping with the room acoustics.

TWO-WAY SYSTEM

1. Check the brochures of the speakers to be used and find the recommended crossover frequency for them. Set the LOW-MID or MID-HIGH switch to the crossover frequency. For example, if the crossover frequency is to be set to 500 Hz, set the LOW-MID switch to 500 and the MID-HIGH switch to OFF. If the crossover frequency is to be set to 2000 Hz (2 kHz), set the MID-HIGH switch to 2K and the LOW-MID switch to OFF.
2. The cut-off characteristic should be selected in the following way: If the LOW-MID switch has been set to OFF, use the MID-L and HIGH switches to select a desired cut-off characteristic.
   If the MID-HIGH switch has been set to OFF, use the LOW and MID-L switches to select a desired cut-off characteristic.
   Setting for a three-way system also apply to a two-way system.
3. The operating procedures for the SF-700, preamplifier and power amplifiers are essentially the same as those (par. 4 to par. 7) mentioned for a three-way system.

3-D SYSTEM

1. Set the LOW-MID switch to 125 or 250
   If the system is three ways, use the MID-HIGH switch to select the crossover frequency recommended in the brochure of the speakers to be used.
2. The cut-off characteristic should be selected in the following way: Set the LOW switch to 18 dB/octave, and set the MID-L switch to an optimum slope determined from the characteristic of the midrange speakers used.
3. The subsequent operating procedures for the SF-700, preamplifier and power amplifiers are essentially the same as those described in par. 4 to 7 under "Three-way System."

ACOUSTIC PHASE OF SPEAKERS

- In a multichannel amplifier system, sound is divided into several frequency ranges by means of 12 dB/octave or 18 dB/octave filters. In such system, a more natural sound effect may often be obtained by reversing the acoustic phases of the speakers used. If the middle- and high-frequency channel power amplifiers are provided with phase reversing switches, operate the switches while listening to the music, to see if a better effect results. If the power amplifiers have no such provision, reverse the speaker terminal connections.

SPECIFICATIONS

SEMICONDUCTORS

	Transistors.....20
	Diodes.....2

CHANNELS

2 channels	LOW Range & HIGH Range
3 channels	LOW Range, MID Range & HIGH Range
Input Impedance	100kΩ at 1kHz
Output Voltage	3.5V (each channel)
Output Impedance	Less than 200kΩ at 1kHz
Load Impedance	More than 20kΩ at 1kHz
Harmonic Distortion	Less than 0.3%
Insertion Loss	Less than -2dB
SN Ratio	More than 85dB

CROSSOVER FREQUENCY

For 3 channels	LOW-MID	125Hz,250Hz,500Hz,700Hz,1kHz
	MID-HIGH	1kHz,2kHz,4kHz,6kHz,8kHz
For 2 channels		125Hz,250Hz,500Hz,700Hz,1kHz 2kHz,4kHz,6kHz,8kHz
Slope Selectors	LOW	6dB/oct. 12dB/oct. 18dB/oct.
	MID-L	6dB/oct. 12dB/oct. 18dB/oct.
	MID-H	6dB/oct. 12dB/oct. 18dB/oct.
	HIGH	6dB/oct. 12dB/oct. 18dB/oct.

CENTER CHANNEL OUTPUT TERMINAL

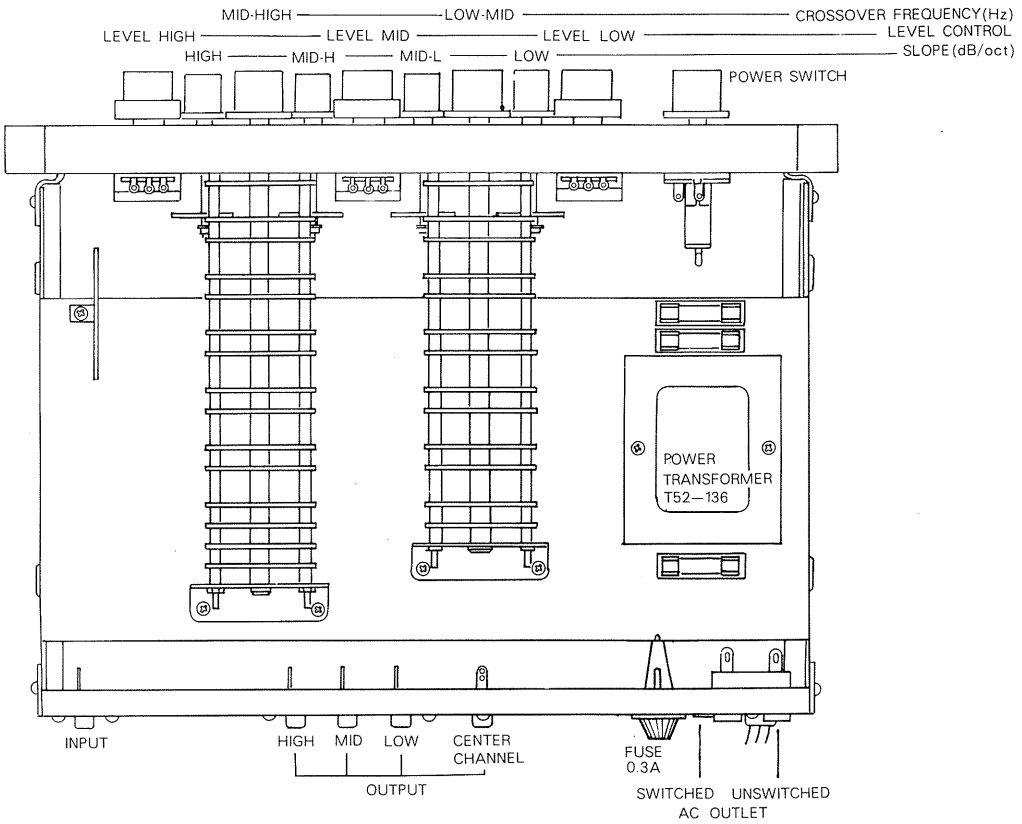
Output Impedance	4kΩ at 70Hz
Load Impedance	More than 4kΩ at 70Hz

MISCELLANEOUS

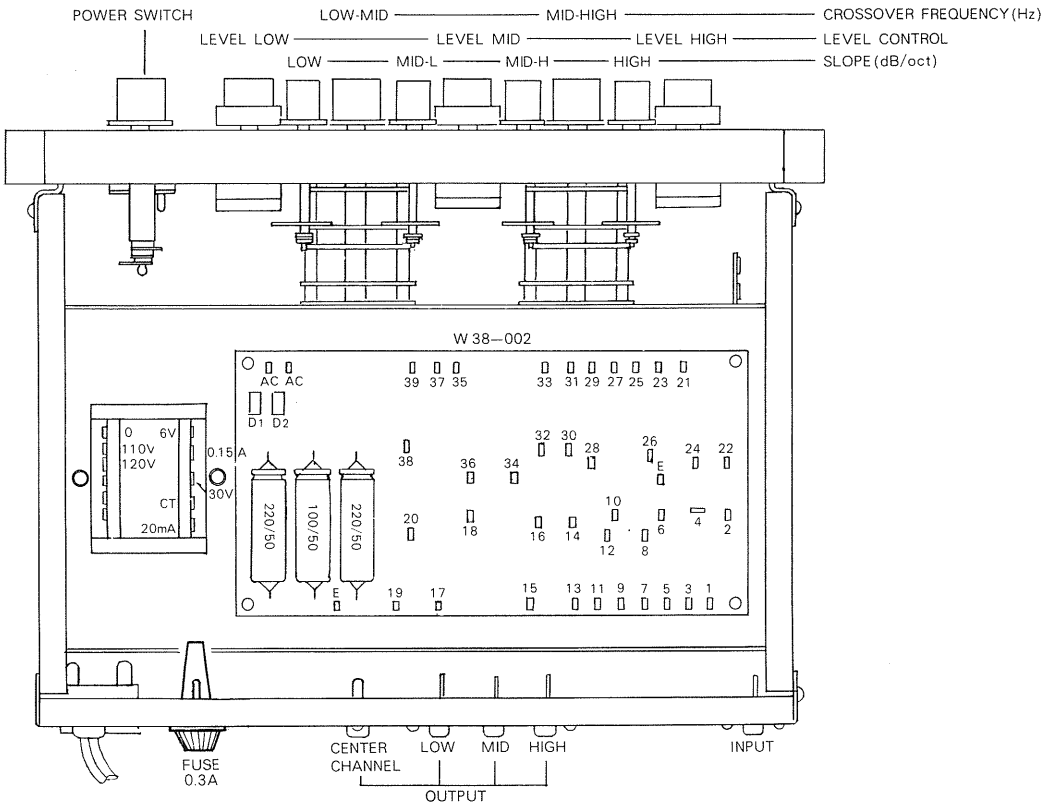
Power Requirements	120Volts	
Power Consumption	6VA	
Dimensions (over-all)	11 13/16" or 300mm	(width)
	4 1/2" or 15mm	(height)
	10" or 254mm	(depth)
Weight	Without package	9 lb or 4.1 kg
	With package	11 lb 4 oz or 5.1 kg

PARTS LAYOUT

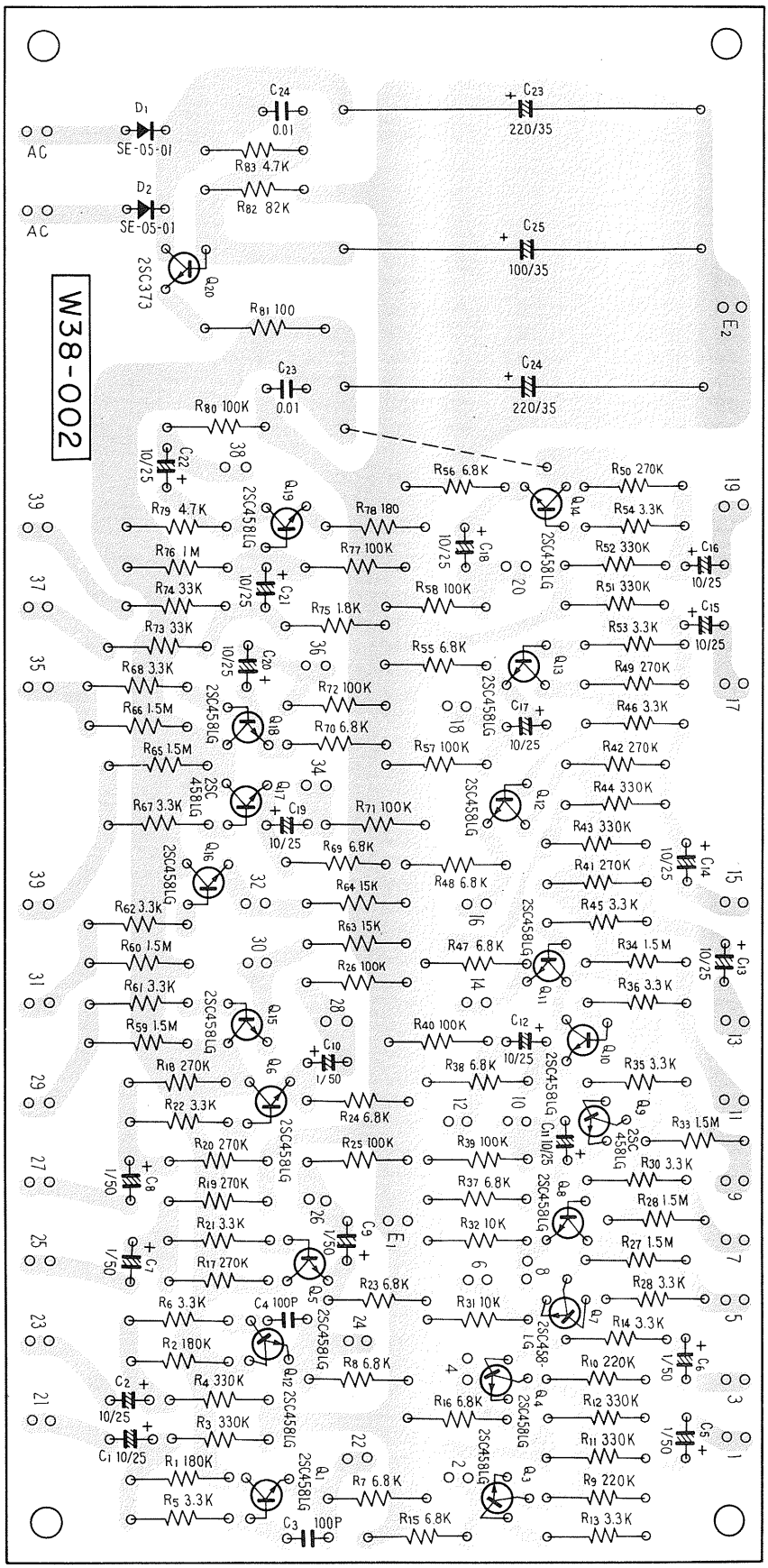
TOP VIEW



BOTTOM VIEW



PRINTED CIRCUIT BOARD



PARTS LIST

CAPACITORS

IN μF, 10% TOLERANCE UNLESS OTHERWISE NOTED P: μμF

Symbol	Description				Part No.
C1	Styrol	1000p	±5%	50V	CQSA 102J50
C2	Styrol	1000p	±5%	50V	CQSA 102J50
C3	Mylar	0.015		50V	CQMA 153K 50
C4	Mylar	0.015		50V	CQMA 153K 50
C5	Mylar	0.0082		50V	CQMA 822K 50
C6	Mylar	0.0082		50V	CQMA 822K 50
C7	Styrol	0.0039	±5%	50V	CQSA 392J 50
C8	Styrol	0.0039	±5%	50V	CQSA 392J 50
C9	Styrol	0.0027	±5%	50V	CQSA 272J 50
C10	Styrol	0.0027	±5%	50V	CQSA 272J 50
C11	Styrol	2200p	±5%	50V	CQSA 222J 50
C12	Styrol	2200p	±5%	50V	CQSA 222J 50
C13	Styrol	1000p	±5%	50V	CQSA 102J 50
C14	Styrol	1000p	±5%	50V	CQSA 102J 50
C15	Mylar	0.015		50V	CQMA 153K 50
C16	Mylar	0.015		50V	CQMA 153K 50
C17	Mylar	0.0082	±5%	50V	CQMA 822J 50
C18	Mylar	0.0082	±5%	50V	CQMA 822J 50
C19	Styrol	0.0039	±5%	50V	CQSA 392J 50
C20	Styrol	0.0039	±5%	50V	CQSA 392J 50
C21	Styrol	0.0027	±5%	50V	CQSA 272J 50
C22	Styrol	0.0027	±5%	50V	CQSA 272J 50
C23	Styrol	2200p	±5%	50V	CQSA 222J 50
C24	Styrol	2200p	±5%	50V	CQSA 222J 50
C25	Styrol	1000p	±5%	50V	CQSA 102J 50
C26	Styrol	1000p	±5%	50V	CQSA 101J 50
C27	Mylar	0.015		50V	CQMA 153K 50
C28	Mylar	0.015		50V	CQMA 153K 50
C29	Mylar	0.0082		50V	CQMA 822K 50
C30	Mylar	0.0082		50V	CQMA 822K 50
C31	Styrol	0.0039	±5%	50V	CQSA 392J 50
C32	Styrol	0.0039	±5%	50V	CQSA 392J 50
C33	Styrol	0.0027	±5%	50V	CQSA 272J 50
C34	Styrol	0.0027	±5%	50V	CQSA 272J 50
C35	Styrol	2200p	±5%	50V	CQSA 222J 50
C36	Styrol	2200p	±5%	50V	CQSA 222J 50
C37	Mylar	0.12		50V	CQMA 124K 50
C38	Mylar	0.12		50V	CQMA 124K 50
C39	Mylar	0.068		50V	CQMA 683K 50
C40	Mylar	0.068		50V	CQMA 683K 50
C41	Mylar	0.033		50V	CQMA 333K 50
C42	Mylar	0.033		50V	CQMA 333K 50
C43	Mylar	0.022		50V	CQMA 223K 50
C44	Mylar	0.022		50V	CQMA 223K 50
C45	Mylar	0.015		50V	CQMA 153K 50
C46	Mylar	0.015		50V	CQMA 153K 50
C47	Mylar	0.12		50V	CQMA 124K 50
C48	Mylar	0.12		50V	CQMA 124K 50
C49	Mylar	0.068		50V	CQMA 683K 50
C50	Mylar	0.068		50V	CQMA 683K 50
C51	Mylar	0.033		50V	CQMA 333K 50
C52	Mylar	0.033		50V	CQMA 333K 50
C53	Mylar	0.022		50V	CQMA 223K 50
C54	Mylar	0.022		50V	CQMA 223K 50
C55	Mylar	0.015		50V	CQMA 153K 50
C56	Mylar	0.015		50V	CQMA 153K 50
C57	Mylar	0.12		50V	CQMA 124K 50
C58	Mylar	0.12		50V	CQMA 124K 50
C59	Mylar	0.068		50V	CQMA 683K 50
C60	Mylar	0.068		50V	CQMA 683K 50
C61	Mylar	0.033		50V	CQMA 333K 50
C62	Mylar	0.033		50V	CQMA 333K 50
C63	Mylar	0.022		50V	CQMA 223K 50
C64	Mylar	0.022		50V	CQMA 223K 50
C65	Mylar	0.015		50V	CQMA 153K 50
C66	Mylar	0.015		50V	CQMA 153K 50
C67	Styrol	1000p	±5%	50V	CQSA 102J 50
C68	Styrol	1000p	±5%	50V	CQSA 102J 50
C69	Styrol	0.0039	±5%	50V	CQSA 392J 50
C70	Styrol	0.0039	±5%	50V	CQSA 392J 50
C71	Styrol	2200p	±5%	50V	CQSA 222J 50
C72	Styrol	2200p	±5%	50V	CQSA 222J 50
C73	Mylar	0.0082	±5%	50V	CQSA 822J 50
C74	Mylar	0.0082	±5%	50V	CQSA 822J 50
C75	Mylar	0.033	±5%	50V	CQSA 333J 50
C76	Mylar	0.033	±5%	50V	CQSA 333J 50
C77	Mylar	0.015		50V	CQMA 153K 50
C78	Mylar	0.015		50V	CQMA 153K 50
C79	Electrolytic	1		50V	CEMX 1MF 50V
C80	Electrolytic	1		50V	CEMX 1MF 50V
C81	Ceramic	0.01			C43-003-0
C83	Oil Paper	0.01			C15-001-0

RESISTORS

1NΩ, 10% TOLERANCE UNLESS OTHERWISE NOTED K: kΩ, M: MΩ

Symbol	Description			Part No.
R1	Carbon film	82K	±5%	RF¼PS 82K-J
R2	Carbon film	82K	±5%	RF¼PS 82K-J
R3	Carbon film	39K	±5%	RF¼PS 39K-J
R4	Carbon film	39K	±5%	RF¼PS 39K-J
R5	Carbon film	18K	±5%	RF¼PS 18K-J
R6	Carbon film	18K	±5%	RF¼PS 18K-J
R7	Carbon film	12K	±5%	RF¼PS 12K-J
R8	Carbon film	12K	±5%	RF¼PS 12K-J
R9	Carbon film	10K	±5%	RF¼PS 10K-J
R10	Carbon film	10K	±5%	RF¼PS 10K-J
R11	Carbon film	82K	±5%	RF¼PS 82K-J
R12	Carbon film	82K	±5%	RF¼PS 82K-J
R13	Carbon film	39K	±5%	RF¼PS 39K-J
R14	Carbon film	39K	±5%	RF¼PS 39K-J
R15	Carbon film	18K	±5%	RF¼PS 18K-J
R16	Carbon film	18K	±5%	RF¼PS 18K-J
R17	Carbon film	12K	±5%	RF¼PS 12K-J
R18	Carbon film	12K	±5%	RF¼PS 12K-J
R19	Carbon film	10K	±5%	RF¼PS 10K-J
R20	Carbon film	10K	±5%	RF¼PS 10K-J
R21	Carbon film	82K	±5%	RF¼PS 82K-J
R22	Carbon film	82K	±5%	RF¼PS 82K-J
R23	Carbon film	39K	±5%	RF¼PS 39K-J
R24	Carbon film	39K	±5%	RF¼PS 39K-J
R25	Carbon film	18K	±5%	RF¼PS 18K-J
R26	Carbon film	18K	±5%	RF¼PS 18K-J
R27	Carbon film	12K	±5%	RF¼PS 12K-J
R28	Carbon film	12K	±5%	RF¼PS 12K-J
R29	Carbon film	10K	±5%	RF¼PS 10K-J
R30	Carbon film	10K	±5%	RF¼PS 10K-J
R31	Carbon film	100K	±5%	RF¼PS 100K-J
R32	Carbon film	100K	±5%	RF¼PS 100K-J

R33	Carbon film	560K	±5%	RF¼PS 560K-J
R34	Carbon film	560K	±5%	RF¼PS 560K-J
R35	Carbon film	180K	±5%	RF¼PS 180K-J
R36	Carbon film	180K	±5%	RF¼PS 180K-J
R37	Carbon film	56K	±5%	RF¼PS 56K-J
R38	Carbon film	56K	±5%	RF¼PS 56K-J
R39	Carbon film	22K	±5%	RF¼PS 22K-J
R40	Carbon film	22K	±5%	RF¼PS 22K-J
R41	Carbon film	15K	±5%	RF¼PS 15K-J
R42	Carbon film	15K	±5%	RF¼PS 15K-J
R43	Carbon film	10K	±5%	RF¼PS 10K-J
R44	Carbon film	10K	±5%	RF¼PS 10K-J
R45	Carbon film	100K	±5%	RF¼PS 100K-J
R46	Carbon film	100K	±5%	RF¼PS 100K-J
R47	Carbon film	560K	±5%	RF¼PS 560K-J
R48	Carbon film	560K	±5%	RF¼PS 560K-J
R49	Carbon film	180K	±5%	RF¼PS 180K-J
R50	Carbon film	180K	±5%	RF¼PS 180K-J
R51	Carbon film	56K	±5%	RF¼PS 56K-J
R52	Carbon film	56K	±5%	RF¼PS 56K-J
R53	Carbon film	22K	±5%	RF¼PS 22K-J
R54	Carbon film	22K	±5%	RF¼PS 22K-J
R55	Carbon film	15K	±5%	RF¼PS 15K-J
R56	Carbon film	15K	±5%	RF¼PS 15K-J
R57	Carbon film	10K	±5%	RF¼PS 10K-J
R58	Carbon film	10K	±5%	RF¼PS 10K-J
R59	Carbon film	100K	±5%	RF¼PS 100K-J
R60	Carbon film	100K	±5%	RF¼PS 100K-J
R61	Carbon film	560K	±5%	RF¼PS 560K-J
R62	Carbon film	560K	±5%	RF¼PS 560K-J
R63	Carbon film	180K	±5%	RF¼PS 180K-J
R64	Carbon film	180K	±5%	RF¼PS 180K-J
R65	Carbon film	56K	±5%	RF¼PS 56K-J
R66	Carbon film	56K	±5%	RF¼PS 56K-J
R67	Carbon film	22K	±5%	RF¼PS 22K-J
R68	Carbon film	22K	±5%	RF¼PS 22K-J
R69	Carbon film	15K	±5%	RF¼PS 15K-J
R70	Carbon film	15K	±5%	RF¼PS 15K-J
R71	Carbon film	10K	±5%	RF¼PS 10K-J
R72	Carbon film	10K	±5%	RF¼PS 10K-J
R73	Carbon film	22K	±5%	RF¼PS 22K-J
R74	Carbon film	22K	±5%	RF¼PS 22K-J
R75	Carbon film	4.7K	±5%	RF¼PS 4R7K-J
R76	Carbon film	4.7K	±5%	RF¼PS 4R7K-J
R77	Carbon film	10K	±5%	RF¼PS 10K-J
R78	Carbon film	10K	±5%	RF¼PS 10K-J
R79	Carbon film	22K	±5%	RF¼PS 22K-J
R80	Carbon film	22K	±5%	RF¼PS 22K-J
R81	Carbon film	4.7K	±5%	RF¼PS 4R7K-J
R82	Carbon film	4.7K	±5%	RF¼PS 4R7K-J
R83	Carbon film	12K	±5%	RF¼PS 12K-J
R84	Carbon film	12K	±5%	RF¼PS 12K-J
R85	Carbon film	1M		RF¼PS 1M-K
R86	Carbon film	1M		RF¼PS 1M-K
R87	Carbon film	1M		RF¼PS 1M-K
R88	Carbon film	1M		RF¼PS 1M-K
R89	Carbon film	1M		RF¼PS 1M-K
R90	Carbon film	1M		RF¼PS 1M-K
R91	Carbon film	1M		RF¼PS 1M-K
R92	Carbon film	1M		RF¼PS 1M-K
R93	Carbon film	1M		RF¼PS 1M-K
R94	Carbon film	1M		RF¼PS 1M-K
R95	Carbon film	1M		RF¼PS 1M-K
R96	Carbon film	1M		RF¼PS 1M-K
R97	Carbon film	1M		RF¼PS 1M-K
R98	Carbon film	1M		RF¼PS 1M-K
R99	Carbon film	1M		RF¼PS 1M-K
R100	Carbon film	1M		RF¼PS 1M-K
R101	Carbon film	1M		RF¼PS 1M-K
R102	Carbon film	1M		RF¼PS 1M-K
R103	Carbon film	1M		RF¼PS 1M-K
R104	Carbon film	1M		RF¼PS 1M-K
R105	Carbon film	1M		RF¼PS 1M-K
R106	Carbon film	1M		RF¼PS 1M-K
R107	Carbon film	1M		RF¼PS 1M-K
R108	Carbon film	1M		RF¼PS 1M-K
R109	Carbon film	1M		RF¼PS 1M-K
R110	Carbon film	1M		RF¼PS 1M-K
R111	Carbon film	1M		RF¼PS 1M-K
R112	Carbon film	1M		RF¼PS 1M-K
R113	Carbon film	1M		RF¼PS 1M-K
R114	Carbon film	1M		RF¼PS 1M-K
R115	Carbon film	1M		RF¼PS 1M-K
R116	Carbon film	1M		RF¼PS 1M-K
R117	Carbon film	1M		RF¼PS 1M-K
R118	Carbon film	1M		RF¼PS 1M-K
R119	Carbon film	1M		RF¼PS 1M-K
R120	Carbon film	1M		RF¼PS 1M-K
R121	Carbon film	1M		RF¼PS 1M-K
R122	Carbon film	1M		RF¼PS 1M-K
R123	Carbon film	1M		RF¼PS 1M-K
R124	Carbon film	1M		RF¼PS 1M-K
R125	Carbon film	1M		RF¼PS 1M-K
R126	Carbon film	1M		RF¼PS 1M-K
R127	Carbon film	1M		RF¼PS 1M-K
R128	Carbon film	1M		RF¼PS 1M-K
R129	Carbon film	1M		RF¼PS 1M-K
R130	Carbon film	1M		RF¼PS 1M-K
R131	Carbon film	1M		RF¼PS 1M-K
R132	Carbon film	1M		RF¼PS 1M-K
R133	Carbon film	1M		RF¼PS 1M-K
R134	Carbon film	1M		RF¼PS 1M-K
R135	Carbon film	1M		RF¼PS 1M-K
R136	Carbon film	1M		RF¼PS 1M-K
R137	Carbon film	1M		RF¼PS 1M-K
R138	Carbon film	1M		RF¼PS 1M-K
R139	Carbon film	1M		RF¼PS 1M-K
R140	Carbon film	1M		RF¼PS 1M-K
R141	Carbon film	1M		RF¼PS 1M-K
R142	Carbon film	1M		RF¼PS 1M-K
R143	Carbon film	1M		RF¼PS 1M-K
R144	Carbon film	1M		RF¼PS 1M-K
R145	Carbon film	1M		RF¼PS 1M-K
R146	Carbon film	1M		RF¼PS 1M-K
R147	Carbon film	1M		RF¼PS 1M-K
R148	Carbon film	1M		RF¼PS 1M-K
R149	Carbon film	1M		RF¼SP 1M-K
R150	Carbon film	1M		RF¼PS 1M-K
R151	Carbon film	1M		RF¼PS 1M-K
R152	Carbon film	1M		RF¼PS 1M-K
R153	Carbon film	1M		RF¼PS 1M-K
R154	Carbon film	1M		RF¼PS 1M-K
R155	Carbon film	1M		RF¼PS 1M-K
R156	Carbon film	1M		RF¼PS 1M-K
R157	Carbon film	1M		RF¼PS 1M-K
R158	Carbon film	1M		RF¼PS 1M-K
R159	Carbon film	1M		RF¼PS 1M-K
R160	Carbon film	1M		RF¼PS 1M-K
R161	Carbon film	1M		RF¼PS 1M-K
R162	Carbon film	1M		RF¼PS 1M-K

POTENTIOMETERS

Symbol	Description	Part No.
VR1	20kΩ dual, High Level Control	C87-027-0
VR2	20kΩ dual, Mid. Level Control	C87-027-0
VR3	20kΩ dual, Low Level Control	C87-027-0

SWITCHES

Symbol	Description	Part No.
S1	Crossover Frequency Selector (Mid-High)	S16-050-0
S2	Crossover Frequency Selector (Low-Mid)	S16-051-0
S3	Slope Selector (High)	S15-036-0
S4	Slope Selector (Mid-H)	S15-036-0
S5	Slope Selector (Mid-L)	S15-036-0
S6	Slope Selector (Low)	S15-036-0
S7	Power Switch	S11-016-A
	Line Voltage Selector	S11-018-0

MISCELLANEOUS

Symbol	Description	Part No.
	Filter Amp Unit	W38-002-0
	Front Panel	M21-381-0
	Metal Cover	M33-112-0
	Knob for Power Switch, Crossover Freq. Selector (Low-Mid) and (Mid-High)	A12-120-A
	Knob for Slope Selector (High, Mid-H, Mid-L and Low)	A12-144-D
	Knob for High Level (R), Mid Level (R), Low Level (R)	A12-150-0
	Konb for High Level (L), Mid Level (L), Low Level (L)	A12-151-0
	Lens for Pilot lamp	A62-045-0
	6p Input Terminal	K22-013-C
	2p Input Terminal	K21-009-C
	1p Input Terminal	K21-005-C
	Power Transformer	T52-136-0
	AC Outlet Socket	K82-011-0
	Pilot Lamp Socket	K42-003-0
	Fuse Holder	K91-007-0
	Pilot Lamp	E22-006-0
	Fuse 0.3A for Power	E21-030-0
	Fuse 0.3A	E21-032-0
	Fuse 0.5A	E21-019-0
	Foot	M61-017-0

FILTER AMP UNIT (W38-002)

CAPACITORS

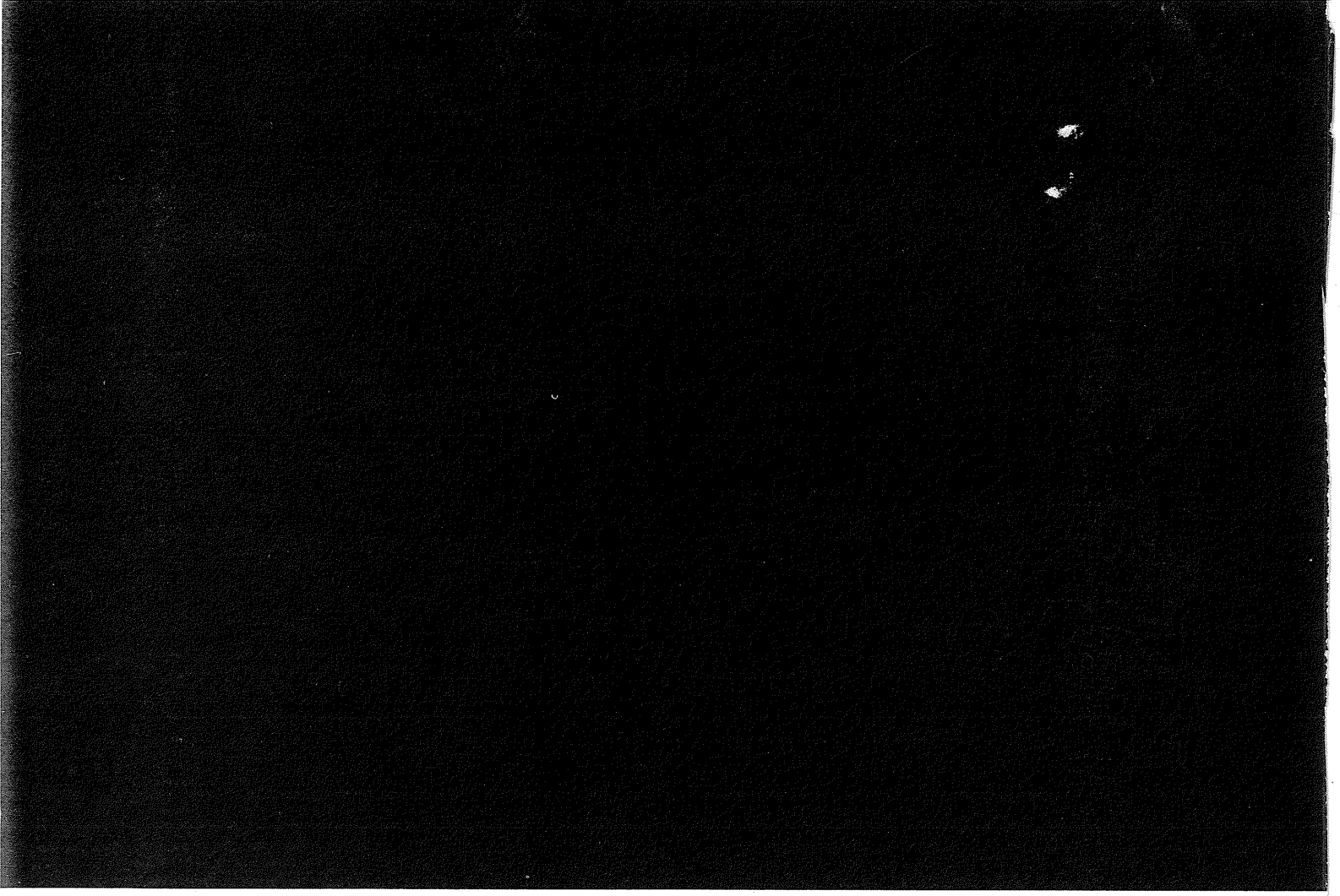
Symbol	Description			Part No.
C1	Electrolytic	10	25V	CEMX 10MF 25V
C2	Electrolytic	10	25V	CEMX 10MF 25V
C3	Ceramic	100p	50V	CCDSL 101K 50
C4	Ceramic	100p	50V	CCDSL 101K 50
C5	Electrolytic	1	50V	CEMX 1MF 50V
C6	Electrolytic	1	50V	CEMX 1MF 50V
C7	Electrolytic	1	50V	CEMX 1MF 50V
C8	Electrolytic	1	50V	CEMX 1MF 50V
C9	Electrolytic	1	50V	CEMX 1MF 50V
C10	Electrolytic	1	50V	CEMX 1MF 50V
C11	Electrolytic	10	25V	CEMX 10MF 25V
C12	Electrolytic	10	25V	CEMX 10MF 25V
C13	Electrolytic	10	25V	CEMX 10MF 25V
C14	Electrolytic	10	25V	CEMX 10MF 25V
C15	Electrolytic	10	25V	CEMX 10MF 25V
C16	Electrolytic	10	25V	CEMX 10MF 25V
C17	Electrolytic	10	25V	CEMX 10MF 25V
C18	Electrolytic	10	25V	CEMX 10MF 25V
C19	Electrolytic	10	25V	CEMX 10MF 25V
C20	Electrolytic	10	25V	CEMX 10MF 25V
C21	Electrolytic	10	25V	CEMX 10MF 25V
C22	Electrolytic	10	25V	CEMX 10MF 25V
C23	Mylar	0.01	50V	CQMA 103K 50
C24	Electrolytic	220	35V	CETG 220MF 35V
C25	Electrolytic	100	35V	CETG 100MF 35V
C26	Mylar	0.01	50V	CQMA 103K 50
C27	Electrolytic	220	35V	CETG 220MF 35V

RESISTORS

Symbol	Description	Part No.
R1	Carbon film 180K	RF¼PS 180K-K
R2	Carbon film 180K	RF¼PS 180K-K
R3	Carbon film 330K	RF¼PS 330K-K
R4	Carbon film 330K	RF¼PS 330K-K
R5	Carbon film 3.3K	RF¼PS 3R3K-K
R6	Carbon film 3.3K	RF¼PS 3R3K-K
R7	Carbon film 6.8K	RF¼PS 6R8K-K
R8	Carbon film 6.8K	RF¼PS 6R8K-K
R9	Carbon film 220K	RF¼PS 220K-K
R10	Carbon film 220K	RF¼PS 220K-K
R11	Carbon film 330K	RF¼PS 330K-K
R12	Carbon film 330K	RF¼PS 330K-K
R13	Carbon film 3.3K	RF¼PS 3R3K-K
R14	Carbon film 3.3K	RF¼PS 3R3K-K
R15	Carbon film 6.8K	RF¼PS 6R8K-K
R16	Carbon film 6.8K	RF¼PS 6R8K-K
R17	Carbon film 270K	RF¼PS 270K-K
R18	Carbon film 270K	RF¼PS 270K-K
R19	Carbon film 270K	RF¼PS 270K-K
R20	Carbon film 270K	RF¼PS 270K-K
R21	Carbon film 3.3K	RF¼PS 3R3K-K
R22	Cargon film 3.3K	RF¼PS 3R3K-K
R23	Carbon film 6.8K	RF¼PS 6R8K-K
R24	Carbon film 6.8K	RF¼PS 6R8K-K
R25	Carbon film 100K	RF¼PS 100K-K
R26	Carbon film 100K	RF¼PS 100K-K
R27	Carbon film 1.5M	RF¼PS 1R5M-K
R28	Carbon film 1.5M	RF¼PS 1R5M-K
R29	Carbon film 3.3K	RF¼PS 3R3K-K
R30	Carbon film 3.3K	RF¼PS 3R3K-K
R31	Carbon film 10K	RF¼PS 10K-K
R32	Carbon film 10K	RF¼PS 10K-K
R33	Carbon film 1.5M	RF¼PS 1R5M-K
R34	Carbon film 1.5M	RF¼PS 1R5M-K
R35	Carbon film 3.3K	RF¼PS 3R3K-K
R36	Carbon film 3.3K	RF¼PS 3R3K-K
R37	Carbon film 6.8K	RF¼PS 6R8K-K
R38	Carbon film 6.8K	RF¼PS 6R8K-K
R39	Carbon film 100K	RF¼PS 100K-K
R40	Carbon film 100K	RF¼PS 100K-K
R41	Carbon film 270K	RF¼PS 270K-K
R42	Carbon film 270K	RF¼PS 270K-K
R43	Carbon film 330K	RF¼PS 330K-K
R44	Carbon film 330K	RF¼PS 330K-K
R45	Carbon film 3.3K	RF¼PS 3R3K-K
R46	Carbon film 3.3K	RF¼PS 3R3K-K
R47	Carbon film 6.8K	RF¼PS 6R8K-K
R48	Carbon film 6.8K	RF¼PS 6R8K-K
R49	Carbon film 270K	RF¼PS 270K-K
R50	Carbon film 270K	RF¼PS 270K-K
R51	Carbon film 330K	RF¼PS 330K-K
R52	Carbon film 330K	RF¼PS 330K-K
R53	Carbon film 3.3K	RF¼PS 3R3K-K
R54	Carbon film 3.3K	RF¼PS 3R3K-K
R55	Carbon film 6.8K	RF¼PS 6R8K-K
R56	Carbon film 6.8K	RF¼PS 6R8K-K
R57	Carbon film 100K	RF¼PS 100K-K
R58	Carbon film 100K	RF¼PS 100K-K
R59	Carbon film 1.5M	RF¼PS 1R5M-K
R60	Carbon film 1.5M	RF¼PS 1R5M-K
R61	Carbon film 3.3K	RF¼PS 3R3K-K
R62	Carbon film 3.3K	RF¼PS 3R3K-K
R63	Carbon film 15K	RF¼PS 15K-K
R64	Carbon film 15K	RF¼PS 15K-K
R65	Carbon film 1.5M	RF¼PS 1R5M-K
R66	Carbon film 1.5M	RF¼PS 1R5M-K
R67	Carbon film 3.3K	RF¼PS 3R3K-K
R68	Carbon film 3.3K	RF¼PS 3R3K-K
R69	Carbon film 6.8K	RF¼PS 6R8K-K
R70	Carbon film 6.8K	RF¼PS 6R8K-K
R71	Carbon film 100K	RF¼PS 100K-K
R72	Carbon film 100K	RF¼PS 100K-K
R73	Carbon film 33K	RF¼PS 33K-K
R74	Carbon film 33K	RF¼PS 33K-K
R75	Carbon film 1.8K	RF¼PS 1R8K-K
R76	Carbon film 1M	RF¼PS 1M-K
R77	Carbon film 100K	PF¼PS 100K-K
R78	Carbon film 180	RF¼PS 180-K
R79	Carbon film 4.7K	RF¼PS 4R7K-K
R80	Carbon film 100K	RF¼PS 100K-K
R81	Carbon film 100 ½W	RF½PS 100-K
R82	Carbon film 82K	RF¼PS 82K-K
R83	Carbon film 4.7K	RF¼PS 4R7K-K

DIODES AND TRANSISTORS

Symbol	Description	Part No.
D1	SE-05-01 Diode	
D2	SE-05-01 Diode	
Q1	2SC458LG C Transistor	
Q2	2SC458LG C Transistor	
Q3	2SC458LG C Transistor	
Q4	2SC458LG C Transistor	
Q5	2SC458LG C Transistor	
Q6	2SC458LG C Transistor	
Q7	2SC458LG C Transistor	
Q8	2SC458LG C Transistor	
Q9	2SC458LG C Transistor	
Q10	2SC458LG C Transistor	
Q11	2SC458LG C Transistor	
Q12	2SC458LG C Transistor	
Q13	2SC458LG C Transistor	
Q14	2SC458LG C Transistor	
Q15	2SC458LG C Transistor	
Q16	2SC458LG C Transistor	
Q17	2SC458LG C Transistor	
Q18	2SC458LG C Transistor	
Q19	2SC458LG C Transistor	
Q20	2SC373 Transistor	



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